

FROST ASSOCIATES

ENTERED

P.O.Box 495, Essex, Connecticut 06426
(203) 767-7644 FAX (203) 767-1971

February 23, 1995

To: PRC Environmental Management Inc.
644 Linn Street, Suite 719
Cincinnati, OH 45203

Attn: James Styers

Fr: Frost Associates
P.O. Box 495
Essex, Conn 06426

Tel: (203) 767-7644
Fax: (203) 767-1971

Fr: Frost Associates
P.O. Box 495
Essex, Conn 06426

Tel: (203) 767-1254
Fax: (203) 767-7069

Sub: E. I. DuPont de Nemours & Co. INDIANA PORTION
Miami Twp., near North Bend, OH

CERCLIS:

Job: 030-0035112D

Site Longitude: 84-48-57 84.815826
Site Latitude : 39-06-45.00 39.112499

The CENTRACTS report below identifies the population, households, and private water wells of each Block Group that lies within, or partially within, the 4, 3, 2, 1, .5, and .25, mile "rings" of the latitude and longitude coordinates above. CENTRACTS may have up to ten radii of any length. 1000 block groups, and 15000 block group sides.

CENTRACTS uses the 1990 Block Group population and Block Group house count data found in the Census Bureau's 1990 STF-1A files. The sources of water supply data are from the Bureau's 1990 STF-3A files. The boundary line coordinates of the Block Groups were extracted from the Census Bureau's 1990 TIGER/Line Files.

CENTRACTS reports are created with programs written by Frost Associates, P.O. Box 495, Essex, Conn. The code was written using Microsoft's Quick-Basic Ver. 4.5.

Latitude and Longitude coordinates identifying a site are entered in degrees and decimal degrees. One or more county files holding Block Group boundary lines are selected for use by CENTRACTS by determining whether the site coordinates fall within the minimum and maximum Lat/Lon coordinates of each county in the state.

Each Block Group line segment has Lat/Lon coordinates representing the "From" and "To" ends of that line. All coordinates from the selected county files are read and converted from degrees, decimal degrees to X/Y miles from the site location. Each line segment is then examined whether it lies within or partially within the maximum ring from the site.

The unique Block Group ID numbers of each line segment that lie within the maximum ring are retained. All Block Group boundary lines matching the Block Group numbers



A method to solve for the area of a polygon is to take one-half the sum of the products obtained by multiplying each X-coordinate by the difference between the adjacent Y-coordinates. For a polygon with coordinates at adjacent angles A, B, C, D, and E. The formula can be expressed:

$$\text{Area} = 1/2\{X_a(Y_e - Y_b) + X_b(Y_a - Y_c) + X_c(Y_b - Y_d) + X_d(Y_c - Y_e) + X_e(Y_d - Y_a)\}$$

For each ring, the selected Block Groups will be inside, outside, or intersected by the ring. When a polygon is intersected, the partial Block Group area within that ring is calculated using the method described below.

When a ring intersects a Block Group, the intersect points are solved and plotted at the points where the ring enters and exits the shape. The chord line, a line within the circle connecting the intersect points is determined. This chord line is used to calculate the segment area, the half moon shape between the chord line and the ring, and the sub-polygon created by the chord line and the Block Group boundaries that lie outside the ring.

The segment area is subtracted from the sub-polygon area to determine the area of the sub-polygon outside the ring. The area outside the ring is then subtracted from the area of the entire polygon to arrive at the inside area. This inside area is then divided by the tract's total area to determine the percentage of area within the ring. This process is repeated for each block group that is intersected by one of the rings. The total area, partial area, and percentage of partial area of those block groups within, or partially within a ring, are held in memory for the report.

On occasion, the algorithm described above is unable to determine the area of the partial area. Within the report program is a "Paint" routine which allows an enclosed shape to be highlighted. Another routine calculates the percentage of highlighted screen pixels to the pixels within the polygon. A manual entry is allowed. Both the "paint" method and manual entry method override the calculated method.

CENTRACTS lists, starting on page 4, all Block Groups in State, County, Census Tract, and Block Group ID order that lie within, or partially within, the maximum ring. Each Block Group is identified by a City or Town name and by the Block Group's State, County, Tract and Block Group ID number. Following is the Block Group's 1990 population and house count extracted from the Census Bureau's 1990 STF-1A files.

The next four columns display water source data from the 1990 STF-3A files. The first column is "Units with Public system or private company source of water", followed by "Units with individual well, Drilled, source of water"; "Units with individual well, Dug, source of water" and "Units with Other source of water".

For each ring, CENTRACTS then shows the Block Groups that are within that ring, the Block Group's total area in square miles, the partial area of the Block Group within that ring, and the partial percentage within the ring. The areas of the included Block Group and the partial areas are then totaled.

The last section tallies the demographic data within each ring. The percentage of area for each Block Group is multiplied times the census data for that Block Group and totaled for all Block Group's within the ring. Ring totals are then determined by subtracting the three mile data from the four mile, the two mile from the three mile, one from the two, etc... Population on private wells is calculated using the formula: $((\text{Drilled} + \text{Dug Wells}) / \text{Households}) * \text{Population}$

No.	City	Block Group ID	Blk Grp People	House Holds	Public Water	Drilled Wells	Dug Wells	Other
1	Jackson	18029 0801	2 1126	425	280	30	0	130
2	Jackson	18029 0801	3 2206	686	620	8	7	48
3	Jackson	18029 0801	4 2243	799	747	0	0	33
4	Lawrenceburg	18029 0803	1 1649	558	560	0	0	11
5	Lawrenceburg	18029 0803	2 632	277	266	0	0	6
6	Lawrenceburg	18029 0803	3 962	444	452	0	0	0
7	Lawrenceburg	18029 0803	4 698	339	332	0	0	0
8	Lawrenceburg	18029 0803	5 705	357	357	0	0	7
9	Lawrenceburg	18029 0804	1 1385	478	456	0	0	35
10	Lawrenceburg	18029 0804	2 1241	495	475	0	0	0
11	Lawrenceburg	18029 0804	3 933	425	422	0	0	0
12	Lawrenceburg	18029 0804	4 1068	403	410	0	0	0
13	Lawrenceburg	18029 0804	5 650	289	304	0	0	0
===	=====	=====	=====	=====	=====	=====	=====	
	Totals:		15498	5975	5681	38	7	270

City	Census Tract ID	Tract People	House Count	Public Water	Drilled Wells	Dug Wells	Other Wells
Jackson	18029 0801	2 1126	425	280	30	0	130
Jackson	18029 0801	3 2206	686	620	8	7	48
Jackson	18029 0801	4 2243	799	747	0	0	33
Sub Totals:		5575	1910	1647	38	7	211
Lawrenceburg	18029 0803	1 1649	558	560	0	0	11
Lawrenceburg	18029 0803	2 632	277	266	0	0	6
Lawrenceburg	18029 0803	3 962	444	452	0	0	0
Lawrenceburg	18029 0803	4 698	339	332	0	0	0
Lawrenceburg	18029 0803	5 705	357	357	0	0	7
Lawrenceburg	18029 0804	1 1385	478	456	0	0	35
Lawrenceburg	18029 0804	2 1241	495	475	0	0	0
Lawrenceburg	18029 0804	3 933	425	422	0	0	0
Lawrenceburg	18029 0804	4 1068	403	410	0	0	0
Lawrenceburg	18029 0804	5 650	289	304	0	0	0
Sub Totals:		9923	4065	4034	0	0	59

For Radius of 4 Mi., Circle Area = 50.265482

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
1	Jackson	18029 8012	24.491911	0.271515	1.11
2	Jackson	18029 8013	10.723692	0.343210	3.20
3	Jackson	18029 8014	7.494226	1.936976	25.85
4	Lawrenceburg	18029 8031	3.746150	3.227734	86.16
5	Lawrenceburg	18029 8032	1.793524	1.783154	99.42
6	Lawrenceburg	18029 8033	1.629749	1.629749	100.00
7	Lawrenceburg	18029 8034	0.137837	0.137837	100.00
8	Lawrenceburg	18029 8035	0.116865	0.116865	100.00
9	Lawrenceburg	18029 8041	9.658498	1.734124	17.95
10	Lawrenceburg	18029 8042	6.089573	6.089573	100.00
11	Lawrenceburg	18029 8043	0.405174	0.405174	100.00
12	Lawrenceburg	18029 8044	0.237667	0.237667	100.00
13	Lawrenceburg	18029 8045	0.282142	0.282142	100.00
Totals:			66.807014	18.195721	

For Radius of 3 Mi., Circle Area = 28.274334

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
3	Jackson	18029 8014	7.494226	0.211078	2.82
4	Lawrenceburg	18029 8031	3.746150	0.416353	11.11
5	Lawrenceburg	18029 8032	1.793524	0.245012	13.66
6	Lawrenceburg	18029 8033	1.629749	1.629749	100.00
7	Lawrenceburg	18029 8034	0.137837	0.137837	100.00
8	Lawrenceburg	18029 8035	0.116865	0.116865	100.00
9	Lawrenceburg	18029 8041	9.658498	0.519008	5.37
10	Lawrenceburg	18029 8042	6.089573	6.031779	99.05
11	Lawrenceburg	18029 8043	0.405174	0.405174	100.00
12	Lawrenceburg	18029 8044	0.237667	0.237169	99.79
13	Lawrenceburg	18029 8045	0.282142	0.281914	99.92
Totals:			31.591406	10.231939	

For Radius of 2 Mi., Circle Area = 12.566371

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
6	Lawrenceburg	18029 8033	1.629749	1.050002	64.43
10	Lawrenceburg	18029 8042	6.089573	3.079598	50.57
11	Lawrenceburg	18029 8043	0.405174	0.091567	22.60
Totals:			8.124496	4.221167	

For Radius of 1 Mi., Circle Area = 3.141593

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
6	Lawrenceburg	18029 8033	1.629749	0.173545	10.65
10	Lawrenceburg	18029 8042	6.089573	0.791502	13.00
Totals:			7.719322	0.965047	

For Radius of .5 Mi., Circle Area = 0.785398

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
6	Lawrenceburg	18029 8033	1.629749	0.051799	3.18
10	Lawrenceburg	18029 8042	6.089573	0.118626	1.95
Totals:			7.719322	0.170425	

For Radius of .25 Mi., Circle Area = 0.196350

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
6	Lawrenceburg	18029 8033	1.629749	0.000358	0.02
10	Lawrenceburg	18029 8042	6.089573	0.002222	0.04
Totals:			7.719322	0.002580	

==== Site Data =====

Population: 9217.63
Households: 3827.18
Drilled Wells: 0.59
Dug Wells: 0.22
Other Water Sources: 40.23

==== Partial (RING) data =====

---- Within Ring: 4 Mile(s) and 3 Mile(s) ----

Population: 2567.97
Households: 932.91
Drilled Wells: 0.59
Dug Wells: 0.22
Other Wells: 28.38

** Population On Private Wells: 2.24

---- Within Ring: 3 Mile(s) and 2 Mile(s) ----

Population: 5191.43
Households: 2261.84
Drilled Wells: 0.00

E. I. DuPont de Nemours & Co.
Miami Twp., near North Bend, OH

INDIANA PORTION

Dug Wells: 0.00
Other Wells: 11.85

** Population On Private Wells: 0.00

---- Within Ring: 2 Mile(s) and 1 Mile(s) ----

Population: 1194.50
Households: 520.82
Drilled Wells: 0.00
Dug Wells: 0.00
Other Wells: 0.00

** Population On Private Wells: 0.00

---- Within Ring: 1 Mile(s) and .5 Mile(s) ----

Population: 208.99
Households: 87.86
Drilled Wells: 0.00
Dug Wells: 0.00
Other Wells: 0.00

** Population On Private Wells: 0.00

---- Within Ring: .5 Mile(s) and .25 Mile(s) ----

Population:	54.09
Households:	23.48
Drilled Wells:	0.00
Dug Wells:	0.00
Other Wells:	0.00

** Population On Private Wells: 0.00

---- Within Ring: .25 Mile(s) and 0 Mile(s) ----

Population:	0.66
Households:	0.28
Drilled Wells:	0.00
Dug Wells:	0.00
Other Wells:	0.00

** Population On Private Wells: 0.00

** Total Population On Private Wells: 2.24

February 22, 1995